

Environmental Protection Agency

Vehicle Preconditioning Procedure

This procedure is written for the Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory (NVFEL) internal use. The use of specific brand names by NVFEL in this procedure are for reference only and are not an endorsement of those products. This document may be used for guidance by other laboratories.

NVFEL Reference Number

703J

Implementation Approval

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Revision Description

- (1) 03-05-96 The purpose of this change is to revise the procedure as described in EPCN #200.

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1. Purpose

The purpose of this procedure is to precondition test vehicles by conducting the Environmental Protection Agency (EPA) Urban Dynamometer Driving Schedule (UDDS).

The preconditioning assures that test vehicles are exposed to a uniform set of conditions which stabilizes them prior to an exhaust emission and/or a fuel economy test.

2. Test Article Description

Test vehicles that require preconditioning. The 48 “single-roll electric dynamometer referenced in this procedure is approved only for use in testing Emission Factor vehicles or other special testing projects as designated by the project officer.

3. References

- 3.1 “Code of Federal Regulations,” Title 40, Subpart B, Sections 86.105, 86.106, 86.108, 86.113, 86.115, 86.128, 86.130, 86.132, 86.136, 86.142, and Appendix I
- 3.2 EPA Engineering Operation Division (EOD) Test Procedures

All references to the EOD Test Procedures include all subsequent revisions thereof.
- 3.3 Mobile Source Air Pollution Control (MSAPC) Advisory Circular No. 50A, “Test Vehicle Preconditioning,” December 16, 1976
- 3.4 “Macintosh Plus Manual” #M1503
- 3.5 MacAcademy training video cassette, “Basic Macintosh”
- 3.6 Memo, R. Lawrence, March 11, 1983, Subject: “Evaluation of Vehicle Acceleration Rate Compliance”
- 3.7 Letter to manufacturers from Robert Maxwell, CD-88-16 (9/27/88), re: “Test Procedures at MVEL”
- 3.8 “Horiba Dynamometer Operation Manual” #091944, November, 1993
- 3.9 “ASTM Rounding Off Procedure,” July 15, 1990
- 3.10 EPA current safety policies

4. Required Equipment

4.1 Form 702-01, "Vehicle Fuel Exchange" (See TP 702)

4.1 Form 703-01, "Vehicle Preconditioning" (Attachment A)

4.2 Form 703-02, "Diesel Vehicle Preconditioning" (Attachment B)

4.3 Form 708-01, "Vehicle Test Data Sheet" (see TP 708)

4.4 Form 801-01, "Data Location"

4.5 Form 902-01, "Test Status Report"

4.6 Ambient Temperature Label

4.7 "Vehicle Specifications Report" (VSR)

4.8 Video Driver's Aid (VDA) System:

4.8.1 Data Acquisition Microcomputer

Equipment used: MacintoshPlus Model #M0001A with Relax Technology
45 Megabyte Hard Disk Drive Model #C46668

4.8.2 Video Monitor

Equipment used: Electrohome Electronics Model #38-V19NWB-AP

4.8.3 Data Acquisition Device

Equipment used: Taurus Model IDAC 2000

4.8.4 Laboratory Network System (LNS)

4.8.5 Printers

Equipment used: Apple LaserWriter

Hewlett Packard Laser Jet

4.9 Chassis dynamometer (dyno):

4.9.1 Twin-roll hydrokinetic dynamometer

Equipment used: Clayton ECE-50 with a power absorption unit to simulate the road load power and flywheels to simulate the vehicle's equivalent test weight.

4.9.2 48 " single-roll electric dynamometer and data acquisition equipment

Equipment used: Horiba LDV-48-86-125HP-AC 48-Inch Single-Roll Electric Dynamometer with:

CDC-900 Computerized Dynamometer Controller

RTM-200 Real Time Computer

CTM250G Microterminal

Power Converter, Power Exchange Unit (PEU), torque measuring system and speed measuring system

4.10 Vehicle restraint system,:

4.10.1 Twin-roll hydrokinetic dynamometer, rear drive type:

Cable winch, permanently affixed to the test cell floor, to restrain the test vehicle horizontally on the dynamometer to minimize vehicle rocking.

Equipment used: Little Mule Products Model #B2 Puller Hoist

4.10.2 Twin-roll hydrokinetic dynamometer, front drive type:

Cable winches, permanently affixed to the test cell floor, or anchor hooks attached to the dynamometer frame, and tie-down straps to restrain front-wheel drive vehicles on the dynamometer

Equipment used: Little Mule Products Model #B2 Puller Hoist
or Eastern Rotorcraft Corp. Tie-Down Part #SP-4212-1

- 4.10.3 Twin-roll hydrokinetic dynamometer, wheel chocks
Equipment used: Clayton
or airplane-style chock blocks
- 4.10.4 48" single-roll electric dynamometer
Equipment used: Single-roll dynamometer wheel chock assembly,
fabricated per EOD requirements.
- 4.11 Exhaust Connectors:
 - 4.11.1 Flexible exhaust tubes
 - 4.11.2 Exhaust tube adapters
 - 4.11.3 Clamps
 - 4.11.4 Gaskets and boot assembly
Equipment used: All the above are fabricated to meet EOD requirements;
see Facility Support Branch (FSB) blueprint file drawings
TO4 88B-(0-11).
- 4.12 Exhaust Gas Sampling System:
 - 4.12.1 Constant Volume Sampler (CVS)
Equipment used: Philco-Ford Model #CVS-20
Horiba Model #1050 CVS Heat/Cool/Filter
 - 4.12.2 CVS Compressor Unit (Blower)
Equipment used: Spencer Turbine Model #2007-H Turbo-Compressor
- 4.13 Compressed air supply with air hose, tire inflation chuck, and calibrated pressure gauge
- 4.14 Fixed speed cooling fan with a capacity not exceeding 5,300 cubic feet per minute (cfm). Additional or special cooling fans may be used if approved in advance by Certification Division or the appropriate Task Officer.
Equipment used: Hartzell Fan, Model #N24-DUWS

- 4.15 Lab Computer System (LCS) interface unit and Test Analysis Processor (TAP) Program.

Equipment used: Datasouth Computer Corporation, Model #DS120 Terminal (a converted Digital Equipment Corp. Decwriter II Terminal, Model #LA36DK) with pressure-sensitive three-part paper and ribbons stored in its vicinity, and the analyzer/LCS interface panel located on the analyzer control module

- 4.16 Type "J" thermocouple and temperature/millivolt transmitter, or thermocouple thermometer connected to a strip chart recorder, or to TAP

Equipment used: Leeds and Northrup Temperature/Millivolt Transmitter, Model #Centry 479

Omega Engineering Thermocouple Thermometer, Model #199

Strip Chart Recorders:
Soltec, Model #33112-2 or #3316-6
Hewlett-Packard, Model #7132A

5. Precautions

- 5.1 The driver must not use the test vehicle brakes and accelerator simultaneously; therefore, brakes and accelerator must be operated sequentially using the same foot.
- 5.2 The restraint system that secures the test vehicle on the twin-roll hydrokinetic dynamometer must have the slack removed so approximately 2 inches of play is at the center of the cable or strap for a front drive system, 4 inches for a rear drive system.
- 5.3 The restraint system that secures the test vehicle on the 48" single-roll electric dynamometer must be adjusted to position the vehicle's drive wheels approximately at the roll surface crown.
- 5.4 When the test vehicle is connected to the CVS, care must be taken to avoid putting excessive strain on the vehicle's exhaust system. The CVS blower must be operating when the vehicle's engine is running.
- 5.5 The exhaust scrubber system (accessed through the test cell floor) must be on and operating properly.

- 5.6 The vehicle starting procedures must be with the vehicle.
- 5.7 If the vehicle is being preconditioned for an FTP exhaust emission test according to the 1978 test sequence [CFR 86.130, "Figure B78 10 Test Sequence"], the UDDS must be started within 1 hour following completion of vehicle fueling; otherwise, TP 702 must be repeated.
- If the vehicle is being preconditioned for an FTP exhaust emission test according to the 1996 test sequence [CFR 86.130, "Figure B96-10 Test Sequence"], the UDDS must be started between 6 and 36 hours after the vehicle is refueled; otherwise, TP 702 must be repeated.
- 5.8 The test cell door(s) must be closed before starting the vehicle engine and while it is operated on a dynamometer.
- 5.9 The driver must remain inside the vehicle in the proper driving position at all times while it is being operated on the dynamometer.
- 5.10 The test vehicle must be correctly aligned on the dynamometer prior to driving.
- 5.11 The 48" single-roll electric dynamometer contactor must be engaged and the "RUN MODE" must be selected before driving the test vehicle.
- 5.12 The 48" single-roll electric dynamometer contactor must be disengaged before removing the test vehicle.
- 5.13 If the vehicle is equipped with power windows, they must be opened before the key is turned off at the end of the preconditioning cycle.
- 5.14 The vehicle's ignition key must remain in the "Off" position until the start of the test. Turning the ignition to "On" can affect the engine fuel system and void the test.
- 5.15 Personnel in the test cell should avoid close proximity to the test vehicle when the 48" single-roll electric dynamometer roll cradle is raised or lowered.
- 5.16 The steps in the 48" single-roll electric dynamometer power shut down procedure must be followed in the correct order. See Section 800.

6. Visual Inspection

- 6.1 Inspect the boots, gaskets, and connecting pipes used between the vehicle and the CVS for leaks and ensure that the CVS I/M port is capped.

- 6.2 If the CVS is not used, ensure that the vehicle exhaust is connected to the exhaust scrubber system.
- 6.3 Inspect the 48" single-roll electric dynamometer and ensure that the contactor is engaged and the "RUN MODE" is selected before driving the test vehicle.

7. Test Article Preparation

The driver is responsible for ensuring that the following steps are performed:

- 7.1 Complete the corresponding sections on Form 703-01 as each step is performed by entering a check mark or NA. Record the following information:
 - Vehicle ID #
 - Test Number
 - Technician ID #
 - Date
- 7.2 Ensure that the Test Cell Air Handling System is operating and in the "Test" position.
- 7.3 Check the test cell ambient temperature.

For Fuel Economy Vehicles, the test cell temperature controller must be set to obtain a test cell temperature in the range of 73-77 °F at the beginning of the prep. For all other vehicles, the temperature must remain within 68-86 °F during all portions of the prep.

If the test cell ambient temperature is not within these limits, notify the vehicle testing (VT) senior technician and/or the Building Services Contractor. Do not continue until the test cell is within the appropriate limits.

- 7.4 Verify that the ambient temperature strip chart recorder power is on (chart recorder power is routinely left on) or that the TAP program is operational.

When the strip chart recorder power has been off for any period of time, an equal period of time (up to 1 hour) with the recorder power on is required for instrument warmup, i.e., 1-minute power off requires a 1-minute warmup, and so on, up to a 1 hour warmup. If you are unable to determine how long the recorder has been off, you must allow the recorder to warm up for a minimum of 1 hour.

If you turn on a recorder, you must record the "Power On Time" on the chart paper.

- 7.4.1 Verify that the strip chart mechanical zeros are set to zero or adjust them if necessary.
- 7.4.2 Verify that the digital thermometer and strip chart recorder agree within 1 °F.
- 7.4.3 Set the chart speed to 10 centimeters (cm) per hour.
- Note:** If the chart recorder used does not have this speed available, set the speed as close as possible to 10 cm/hr.
- 7.4.4 Place the “Ambient Temperature” label on the chart paper and enter the required information:
- Date
 - ET #
 - Chart Speed
 - Dyno #
 - Test #
 - Vehicle ID #
 - Tech ID #
- 7.5 As an alternative, TAP may be used to monitor the test cell ambient temperature. Prepare the terminal to be used for LCS-TAP. Ensure that the Decwriter terminal has sufficient pressure-sensitive three-part paper and ribbon. Approximately 10 pages of paper are required per test. Ensure that the Decwriter terminal power switch is on and that the eight-key function pad on the left of the Decwriter terminal keyboard is in the following configuration:
- The “Caps Lock” key must be in the depressed position.
- LINE LOC: raised
 - LOC COPY: raised
 - BAUD RATE: both the 110 and 300 keys depressed selecting 1200 BAUD
 - REV CHAN: raised
 - FDX HDX: raised
 - AUTO LF: raised
 - CODE: raised

The symbols < > are used to indicate a key entry.

Example: Press <1> to start.

This means that you need to press the key labeled "1" to start the equipment.

- 7.5.1 Activate TAP on the analyzer site Decwriter terminal by pressing <BREAK>. The "TSP OPCOM X (or Y) PROD" message should appear. If it does not, call the Computer Room.
- 7.5.2 Type "\$ACTIVATE TAP" and press <RETURN>. Wait for the active instrument calibrations to be picked up by TAP. This is signaled by the printing of the span point table, and may take several minutes.
- 7.5.3 Before placing the vehicle on the dynamometer, check ambient conditions in the test cell by pressing <BREAK>. The "TSP OPCOM X (or Y) PROD" message should appear.
- 7.5.4 Type "A" and press <RETURN>. TAP will print out the ambient conditions.
Ensure that the "LINE LOC" key is in the raised position.

If it is not, ambient TAP messages will not be printed during the preconditioning cycle.
- 7.5.5 Place the "Ambient Temperature" label on the TAP printout paper and enter the required information.
- Note:** Several variations of the TAP command are acceptable. For example, the options "\$ACTIVATE TAP" and "\$RUN TAP" will both initialize the program. All options are listed on the sites, and any option is acceptable to activate the program.
- 7.6 VDA System: To operate the VDA, you may need to view MacAcademy's "Basic Macintosh" videotape, which is a self-taught course explaining the operation of the Macintosh personal computer. See Attachment F for more details on VDA operation.

7.7 Power start-up for the 48-inch single-roll electric dynamometer:

- 7.7.1 If it is not already off, turn off the “DC Bus” power by placing the switch on the left front of the power converter cabinet in the “POWER OFF” position.
- 7.7.2 Turn on the “Isolation Transformer” power using the “Cutler Hammer Heavy Duty Safety Switch[®]” next to the power converter cabinet.
- 7.7.3 Turn the “RESET OFF-ON” switch on the right front of the power converter cabinet to “ON.”
- 7.7.4 Wait a minimum of 5 seconds and place the switch on the left front of the power converter cabinet in the “BUS ON” position.
- 7.7.5 Wait a minimum of 5 seconds and press the blue “RESET” button on the front of the power converter cabinet.

A blue-lighted button indicates the power is on.
- 7.7.6 Ensure that the cooling fan thermostat (next to the power converter cabinet) is set to the mark between “COOLER” and “WARMER.”
- 7.7.7 Turn on the CDC-900 computer and monitor (located in the test cell) using the handle on the front of the CDC-900 cabinet.
- 7.7.8 Turn on the RTM-200 computer (located in the test site control room). The screen will display “DYNAMOMETER MAIN MENU.”
- 7.7.9 Wait for the screen message, “DONE SENDING PARAMETERS.” Press the green “START” button on the CDC-900 cabinet to engage the contactor. This can also be accomplished by pressing the “START” button on the driver’s pendant.

Note: If the dynamometer has been idle for more than 120 minutes, the contactor will automatically be switched off. The “START” button on either the CDC-900 or the driver’s pendant must be pressed to re-engage it.

- 7.7.10 If either the RTM-200 or CDC-900 computers lock up, both should be re-booted as follows:
- Turn the RTM-200 computer power switch off.
 - Turn the CDC-900 power off using the black handle on the CDC-900 cabinet.
 - Wait for a minimum of 10 seconds and turn the RTM-200 computer on, then turn on the CDC-900.
 - Wait for the “DONE SENDING PARAMETERS” message on the RTM-200 computer display, and press the contactor “START” button on the CDC-900 or the driver’s pendant.
 - If the reboot attempt is unsuccessful, notify Calibration and Maintenance (C&M).
- 7.8 Power start-up for the 48" single-roll electric dynamometer following a power interrupt is as follows:
- Turn off the “DC Bus” power by placing the switch (on the left front of the power converter cabinet) in the “POWER OFF” position.
 - Turn off the “CDC-900 Computer” located in the test cell using the black handle on the front of the “CDC-900 Cabinet.”
 - If the “Isolation Transformer” 3-phase power has been shut off, turn it on using the “Cutler Hammer Heavy-Duty Safety Switch®” next to the power converter cabinet.
 - Turn the black handle on the right front of the power converter cabinet to the “RESET/OFF” position and follow Steps 7.7.3 through 7.7.10.
 - If the power start-up attempt is unsuccessful, notify C&M.
- 7.9 Start the chart recorder and mark the starting point on the strip chart.

8. Test Procedure

Form 703-01 provides an instructional list to verify that each step is completed, thereby ensuring proper execution of the test procedure. The draining and fueling of the vehicle prior to the heat build test are described in TP 702. The technician documents completion of steps by checking the “Verify the following” box on Form 703-01. All directions for completing Form 703-01 are identical for Form 703-02, where applicable.

Twin-Roll Hydrokinetic Dynamometer procedures are described in Sections 100 and 400. 48-inch single-roll electric dynamometer procedures are described in Sections 200 and 500.

100 Twin-Roll Hydrokinetic Dynamometer Setup

- 101 Drive or crab the vehicle onto the dynamometer, placing the drive wheels on the rolls. Leave the vehicle in neutral.
- 102 When the vehicle enters the test cell, label the TAP printout or ambient temperature strip chart “On Dyno #X.” The “X” is the dyno number, such as 1, 2, 3, etc.
- 103 Check and adjust the drive tire pressure to 45 psi, unless otherwise specified.
- 104 Set the dynamometer inertia weight (equivalent test weight) to the value specified for the vehicle on the VSR.
- 105 Check that the indicated horsepower (IHp) is set correctly. The IHp is obtained from the chart of actual horsepower (AHP) vs. IHp, posted on each dyno.

If the AHP required is not listed, calculate the IHp using the coefficient for the specific inertia weight on the chart. Use the “ASTM Rounding Off Procedure” to determine the correct horsepower to the tenth place. The coefficient will be different for each dyno; therefore, be sure to use the chart posted on the dyno.
- 106 Press the dyno “Index” light button, located on the Road Load Power Control (RLPC) box.
- 107 While the light is flashing select the indicated horsepower using the thumbwheels on the dyno RLPC box. Ensure that the horsepower is set during the flashing light sequence; if it is not set during this period, press the index light again and enter the horsepower while the light is flashing.

If the light either fails to flash or will not stop flashing, notify C&M.
- 108 Release the dyno roll brake when the “Index” light stops flashing.
- 109 Ensure that the correct inertia weights are engaged by lifting the cage and rolling the flywheels by foot.

- 110 Ensure that the front/rear roll switch is in the “Rear Roll” position.
- 111 Center the drive wheels on the dyno rolls by operating the vehicle in a forward gear momentarily until the vehicle is centered. Ensure that the drive-tires have adequate side clearance from the dynamometer frame so they will not rub and become damaged.
- If the vehicle fails to center properly, or there is not adequate clearance, notify the VT senior technician.
- 112 Connect the vehicle restraint system. The rear drive type system must have the slack removed and allow approximately 4 inches of play at the center of the cable or strap. The front drive system must have the slack removed and allow approximately 2 inches of play at the center of the cable or strap.
- Do not overtighten the cable.
- 113 Connect the vehicle exhaust to the exhaust scrubber system or CVS unit.
- If the CVS is used, ensure that the CVS exhaust hose is inserted in the exhaust scrubber system and it is not crimped.
- 114 Open the vehicle hood or engine compartment cover.
- 115 Position the cooling fan(s) within 12 inches of the vehicle (unless otherwise specified) and turn the power to the cooling fan(s) on. On Form 703-01, indicate the placement of the fan(s) around the drawing of the vehicle.
- 116 Place the wheel chocks in front of the non-drive wheels. If airplane style chocks are used, position each around a non-drive wheel of the vehicle and tighten them until they fit snugly around the tire.
- 117 Check that all accessory switches on the vehicle are in the “Off” position and all windows are down prior to starting the engine. If not, turn them off and lower the windows.
- 118 If the vehicle is connected to the CVS sample collection unit, turn the CVS blower on.
- 119 When Steps 100 through 118 are performed and verified, place check marks in the corresponding spaces on Form 703-01 (Form 703-02 for diesel vehicles).
- 120 Go to Step 300.

200 48" Single-Roll Electric Dynamometer Setup

Note: Cradle and centering functions can be controlled by either the CTM250G microterminal at the driver's station, or the RTM-200 computer keyboard in the site control room.

201 Retract the roll covers of the 48" single-roll electric dynamometer by pressing the "COVER ON/OFF" button on the CTM250G Driver's Station.

202 Drive or crab the vehicle onto the dynamometer, placing the drive wheels on the roll. Leave the vehicle transmission in neutral.

Note: Personnel in the test cell should avoid close proximity to the vehicle when the 48" single-roll electric dynamometer roll cradle is raised or lowered.

203 Raise the roll cradle by pressing the "CRADLE UP/DOWN" button on the CTM250G microterminal.

204 When the vehicle enters the test cell, label the ambient temperature strip chart or TAP printout "On Dyno #X." The "X" is the dyno number, such as 1, 2, 3, etc.

205 To engage the dyno contactor, press <START> on the CDC-900 cabinet or <START> on the remote driver's station pendant.

206 Center the vehicle by pressing the CTM250G microterminal "CENTERING START/STOP" button.

207 In response to the prompt on the CTM250G microterminal screen, use the CTM250G driver's station keyboard to enter the value specified for the VSR vehicle weight (equivalent test weight).

The "CENTERING START/STOP" button on the CTM250G microterminal will remain lit, and the RTM-200 computer screen will show acceleration to a speed of 1 mph while the rolls are turning.

208 Position one of the wheel chock assemblies around a non-drive wheel of the vehicle. Insert the linkage bar locking nuts in the tee-slot tracks.

209 Slide the moveable wheel chock so that both parts of the chock assembly fit against the tire and draw the chocks firmly together against the tire by turning the handle clockwise on the threaded rod.

- 210 Secure the locking nut which bolts the free end of the linkage bars to the tee-slot tracks.
- 211 Repeat Steps 208 through 210 to position the other wheel chock assembly against the other non-drive wheel of the vehicle.
- 212 Visually ensure that the front and rear cradle rolls are turning at about the same speed and the vehicle drive wheels are positioned approximately at the roll surface crown.
- If not, adjust the wheel chock positions until the rolls appear to be turning at the same speed.
- 213 Stop the rolls by pressing the CTM250G “CENTERING START/STOP” button.
- 214 Lower the cradle by pressing the “CRADLE UP/DOWN” button on the CTM250G microterminal.
- 215 Cover the exposed portion of the rolls by pressing the “COVER ON/OFF” button on the CTM250G microterminal.
- 216 Check and adjust the drive tires to the manufacturer’s recommended pressure per the VSR, unless otherwise specified.
- 217 Use the RTM-200 computer keyboard and select “ROAD SIMULATION” from the “DYNAMOMETER MAIN MENU” screen.
- 218 Ensure that the “BRAKE” is “OFF,” the “CRADLE” is “DOWN,” and observe that the dyno rolls are not moving.
- 219 Use the RTM-200 computer keyboard and obtain the “VEHICLE SIMULATION PARAMETERS” screen by pressing <F2>.
- 220 Select the appropriate vehicle ID by pressing <PgUp> or <PgDn>. The vehicle ID will be shown next to “Class” on the screen.
- 221 Recall or enter the correct test number, inertia (ETW), and A, B, and C coefficients. The A, B, and C coefficients are in the comments section of the VSR.
- 222 Look at the RTM-200 computer screen and ensure that the “Augmented Braking” is “OFF,” unless indicated otherwise on the VSR. Use the right or left arrow key to turn “Augmented Braking” “ON” or “OFF.”

- 223 Use the RTM-200 computer keyboard right or left arrow key to select “NO” for “Grade” simulation.
- 224 Use the RTM-200 computer keyboard and press <Esc> to return to the “SET UP MODE” of the “ROAD SIMULATION” screen.
- 225 If no warning messages are displayed, press <F1>, followed by <Esc> to return to the “RUN MODE.”
- 226 If warning messages are displayed, address the warning (see “Horiba Dynamometer Operations Manual”), then press <F1>, followed by <Esc> to return to the “RUN MODE.”
- 227 Connect the vehicle exhaust to the floor exhaust scrubber system or the CVS unit.
- If the CVS is used, ensure that the CVS exhaust hose is inserted in the exhaust scrubber system and is not crimped.
- 228 Open the vehicle hood or engine compartment cover.
- 229 Position the cooling fan(s) within 12 inches of the vehicle (unless otherwise specified) and turn the power to the cooling fan(s) on.
- On Form 703-01 (Form 703-02 for diesel vehicles) use the drawing of the vehicle and indicate the fan placement.
- 230 Check that all accessory switches on the vehicle are in the “Off” position and all windows are down prior to starting the engine. If not, turn them off and lower the windows.
- 231 If the vehicle is connected to the CVS, turn the blower on.
- 232 When Steps 200 through 231 are performed and verified, place check marks in the corresponding spaces on Form 703-01 (Form 703-02 for diesel vehicles).

300 Video Drivers Aid (VDA) System

- 301 Position the mouse pointer on “Test” and press and hold down the mouse button, opening the “Test” Menu. Continue to hold down the mouse button, pull the mouse toward you, and position the pointer on “Setup for Driving;” then release the mouse button to select it. See Figure 1.

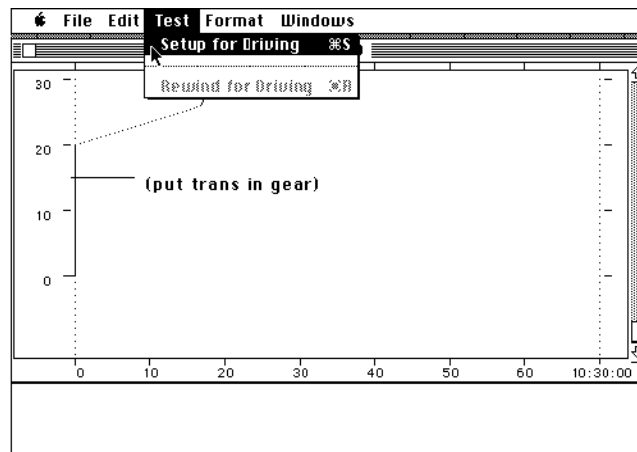


Figure 1

- 302 Ensure that the “Ready” indicator is on at the bottom of the VDA screen. See Figure 2.
- 303 Start the vehicle's engine according to the manufacturer's recommended starting procedures and follow the instructions at the bottom of the screen. If the engine does not start within 10 seconds of cranking, cease cranking. To start the VDA trace scrolling, press <S> twice. The crank time will be displayed on the left side of the Control Dialog Box.

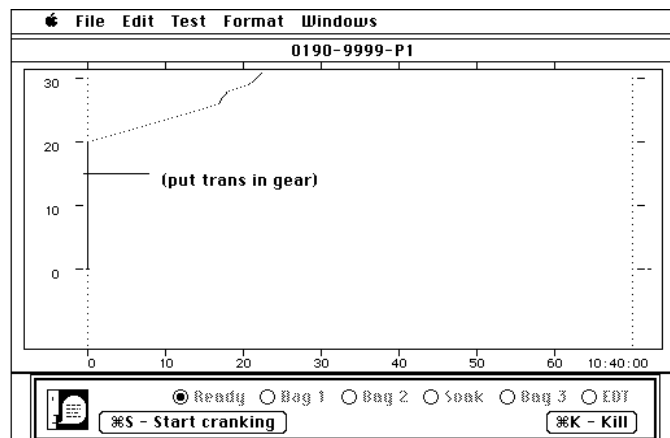


Figure 2

If a start is attempted and the engine does not start within 10 seconds of cranking, pause for 10 seconds and crank again. Not more than three 10-second cranks with 10-second pauses between each crank should be attempted. After three unsuccessful start attempts, notify the VT senior technician, the manufacturer's representative (certification vehicles), or the appropriate EPA Task Officer (in-use vehicles) to make recommendations for the engine to be restarted.

If the failure to start is determined to be a vehicle malfunction, corrective action of less than 30 minutes' duration may be taken by the manufacturer's representative if accompanied by Certification Division personnel or the appropriate Task Officer.

If the engine false starts (i.e., does not continue to run when the ignition switch is returned to the "On" position following the cranking), repeat the recommended starting procedure, pausing for 10 seconds before cranking for 10 seconds, unless otherwise recommended by the manufacturer or appropriate Task Officer.

The preconditioning may be continued if less than 1 hour has passed since vehicle fueling (TP 702).

304 If the vehicle ignition key has not been turned to the start position and you need to stop the trace, press <Command-Space Bar>. Select "Resetup Test" in the dialog box by positioning the mouse pointer on this button and clicking once. Return to Step 301.

305 If the engine cannot be restarted before the initial acceleration, immediately stop the VDA trace by pressing <Command-Space Bar>. Restart the engine and immediately restart the VDA trace by pressing <Command-S>.

If the vehicle's engine false starts three times, cease cranking and notify the VT senior technician, the manufacturer's representative (certification vehicles), or the appropriate EPA Task Officer (in-use vehicles) to make recommendations for the engine to be restarted.

If the failure to start is determined to be a vehicle malfunction, corrective action of less than 30 minutes' duration may be taken by the manufacturer's representative if accompanied by Certification Division personnel or the appropriate Task Officer.

If the vehicle is being preconditioned for an FTP exhaust emission test according to the 1978 test sequence, the preconditioning may be continued if less than 1 hour has passed since vehicle fueling (TP 702).

If the vehicle is being preconditioned for an FTP exhaust emission test according to the 1996 test sequence, the preconditioning may be continued if less than 36 hours has passed since the vehicle fueling (TP 702).

- 306 Operate the vehicle for one Urban Dynamometer Driving Schedule (UDDS). See Figure 3. See Attachment E, “UDDS Preconditioning Specifications” for a list of driving techniques to be followed during the vehicle preconditioning.

If at any time during the driving of the UDDS a condition occurs that requires the driver to add a comment, press <~>. This will flag the data for entry of a comment at a time convenient for the driver.

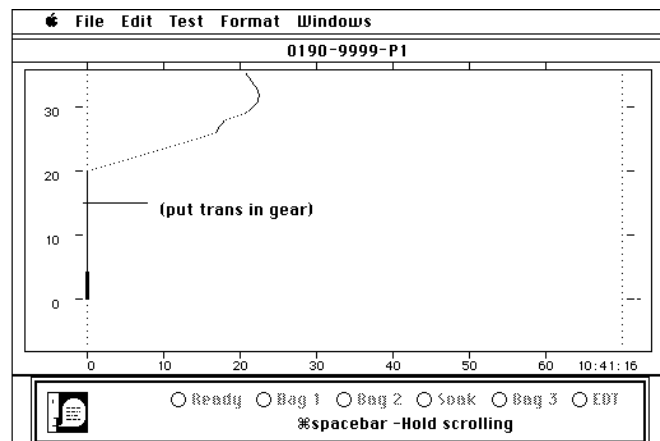


Figure 3

Note: Before driving the vehicle on the 48" single-roll electric dynamometer, ensure that it is in the “RUN MODE” and the contactor has been engaged.

- 307 If problems occur before the second acceleration (165 seconds) of the driving cycle, the prep LA-4 may be stopped by selecting <Command-Space Bar> and the corrective action may then be taken.

If problems occur after initiation of the driving cycle's second acceleration, the vehicle must be refueled per TP 702.

If the vehicle is being preconditioned for a 1978 test sequence FTP, the prep LA-4 cycle may be restarted, providing the time constraint of not more than 1 hour between the completion of vehicle fueling (TP 702) and the initiation of the LA-4 prep cycle is not violated.

If the vehicle is being preconditioned for a 1996 test sequence FTP, the prep LA-4 cycle may be restarted, providing the time constraint of not more than 36 hours between the completion of vehicle fueling (TP 702) and the initiation of the LA-4 prep cycle is not violated.

- 313 Record the end time of the LA-4 prep cycle on Form 708-01.
- 314 If the vehicle requires additional LA-4 cycle(s), turn off the engine, the cooling fan(s), and the CVS blower, if used. Close the hood or engine compartment cover of the vehicle.
- 315 Ensure that the ambient temperature monitoring system is on during the soak. Mark the End of Prep (EOP) point on the test cell ambient temperature strip chart and soak the vehicle for at least 1 hour between cycles.

If LCS-TAP has been used to monitor test cell ambient temperature, check the ambient conditions in the test cell and press <BREAK>. The “TSP OPCOM X (or Y) PROD” banner message should appear. Type “A” and press <RETURN>. TAP will print out the ambient conditions.

- 316 Additional LA-4 cycles may be performed if the vehicle has not been operated (i.e., an LA-4 equivalent) for more than 5 days (120 hours), if requested or required by a particular test program, or if unusual circumstances occur.
- 317 For abnormally treated petroleum-fueled diesel vehicles, as defined in 86.085-2, the preconditioning may consist of two highway Fuel Economy Driving Schedules (found in Part 600, Appendix I) run in immediate succession, with the road load power set at twice the value obtained from 86.129.

If the soak exceeds 3 hours, notify the VT senior technician.

- 318 If the vehicle has been prepped for an exhaust emission test (TP 707), do not turn off the engine.

- 319 If the vehicle has been prepped for a Highway Fuel Economy Test (HWFET):

The engine may be turned off and the vehicle allowed to soak indoors at temperatures not less than 68 °F nor greater than 86 °F for up to 3 hours before the highway preconditioning cycle is started. Vehicles may remain on the dynamometer for up to 2 hours prior to the start of the highway preconditioning cycle, thereby eliminating the necessity to perform a dynamometer warmup.

Alternatively, the preconditioning highway cycle may be driven immediately following the preconditioning LA-4, providing the vehicle is connected to the CVS sample collection unit.

- 320 Close the hood or engine compartment cover and move the cooling fan(s) out of the way.
- 321 Disconnect the vehicle exhaust system from the CVS or floor exhaust dump.
- 322 If the vehicle is on the 48" single-roll electric dynamometer, go to Step 501.

400 Vehicle Removal - Twin-Roll Hydrokinetic Dyno

- 401 Disconnect the restraint system, including wheel chocks, from the vehicle.
- 402 Engage the dynamometer roll brake by pressing the red button on the dyno control panel.
- 403 Go to Step 601.

500 Vehicle Removal - 48" Single-Roll Electric Dyno

- 501 Print the "DYNAMOMETER REPORT" by pressing <Alt> and <P> on the RTM-200 computer keyboard. Verify that the A, B, and C coefficients on the "DYNAMOMETER REPORT" correspond with the data on the VSR.

If there are omissions, inconsistencies or errors, notify a VT senior technician.

If there are no omissions, inconsistencies, or errors, enter your technician ID number and the date on the "DYNAMOMETER REPORT" and place it in the test packet.

- 502 Press <F1> on the RTM-200 computer keyboard. The message "END THIS TEST NOW? Y/N" will appear on the screen. Selecting "Y" will save the data and return the controller to the "SET-UP MODE."
- 503 On the RTM-200 monitor, verify that the positive and negative simulation errors are less than $\pm 0.05\%$, respectively.

If the average positive simulation error equals or exceeds 0.05% or the average negative simulation error equals or exceeds -0.05%, notify C&M. The prep is void and the vehicle must be rescheduled.
- 504 Press the contactor "Stop" button on the CDC-900 cabinet.

- 505 Retract the roll covers by pressing the “COVER ON/OFF” button on the CTM250G microterminal.
- 506 Raise the cradle by pressing the “CRADLE UP/DOWN” button on the CTM250G microterminal.
- 507 Disconnect the restraint system from the vehicle by loosening the linkage bar locking nuts. Disengage and remove the wheel chock assemblies from the non-drive tires. Slide the assemblies away from the tires and, if necessary, lift the assembly out of the tee-slot tracks to provide more clearance. When the cradle is lowered, the vehicle could move slightly along the roll. Since the movement can be up to one foot in either direction, personnel in the test cell should avoid close proximity to the vehicle when the cradle is lowered.
- 508 Lower the cradle by pressing the “CRADLE UP/DOWN” button on the CTM250G microterminal.
- 509 Apply the roll brake by pressing the “BRAKE ON/OFF” button on the CTM250G microterminal.

600 End of Vehicle Preconditioning

- 601 If it has been prepped for an FTP, drive the vehicle off the rolls at minimum necessary throttle into the soak area. If engine stalls or is shut off before the vehicle is parked, crab or push the vehicle to the parking area. Do not restart the engine.
- 602 Park the vehicle and ensure that the engine is turned off within 5 minutes after completing the LA-4 cycle. The engine must not be restarted once the final LA-4 prep cycle has been completed until the beginning of the cold start exhaust emission test.
- 603 Vehicles being preconditioned according to the 1978 test sequence are required to soak for a minimum of 12 hours and a maximum of 36 hours before the engine may be started for the Exhaust Emission Test. The hood may be opened for inspection purposes after 1 hour of soak time has elapsed from the end of prep.

For vehicles being preconditioned according to the 1996 test sequence, drain the fuel tank(s) and fill with test fuel, as specified in CFR 86.113, to the "tank fuel volume" defined in CFR 86.082-2. The vehicle shall be refueled within one hour of completion of the preconditioning drive. See TP 702.

Vehicles being preconditioned according to the 1996 test sequence shall be soaked for not less than 12 hours nor more than 36 hours between the end of the refueling event and the beginning of the cold start exhaust emission test. During the soak period, evaporative canisters, if the vehicle is so equipped, shall be preconditioned. See TP 716.

- 604 On Form 708-01, enter the correct data for the following:
- | | |
|------------------|---|
| “LA4 PREP ID” | Card B, Columns 53 through 57 |
| “PREP DYNO SITE” | Card B, Columns 58 through 61 |
| “PREP KEY OFF” | Card B, Columns 72 through 75
(use 24 hour convention) |
- 605 If LCS-TAP has been used to monitor test cell ambient temperature, verify that the test cell temperature remained within the 68-86 °F limits. To obtain the ambient temperature printout from the Decwriter, press <Break>. Place the printout on the vehicle clipboard. If a strip chart recorder has been used to monitor test cell ambient temperature, verify that the test cell temperature remained within the 68-86 °F limits.
- If the temperature is out of these limits, the vehicle must be prepped again; if the prep is for an FTP, start with TP 702; if the prep is for a Highway Fuel Economy Test, TP 702 may be bypassed if sufficient fuel remains to complete the preconditioning.
- If two vehicles are in the test cell simultaneously, the temperature strip chart remains with the vehicle that has the lowest test number.
- 606 Remove the strip chart from the recorder and place it on the vehicle clipboard. Complete Form 801-01 for the prep which has the higher test number to indicate where the strip chart is filed and place the form in that packet.
- 700 Editing Driving Events**
- 701 To edit the “Summary Report,” position the mouse pointer on the scroll arrow and hold down the mouse button until the “Out-of-Tolerance Events” are in view. See Attachment G for more details. Out-of-tolerance events must be documented.
- 702 When editing is completed, the VDA will return to “Daily Preps Window.”
- 703 Retrieve the Video Driver's Aid Test Report and review it for inconsistencies (e.g., wrong ID#, test #, vehicle weight, etc.). If no inconsistencies are found, place it on the clipboard.
- If inconsistencies are found, discard the report. Open the VDA file, make the appropriate corrections, and print another report. Place the new report on the clipboard.

800 48" Single-Roll Electric Dyno Power Shut-Down

Note: It is important that the steps are followed in the order given. Perform the power shutdown when the day's testing is complete.

801 Turn off the power to the DC bus, 3-phase power converter, CDC-900 computer and RTM-200 computer as follows:

802 Visually ensure that the dynamometer rolls are not turning.

803 Close the roll covers by pressing the "COVER ON/OFF" button on the CTM250G microterminal.

804 Press either the CDC-900 "STOP" button, or the "STOP" button on the driver's pendant, to disengage the contactor.

805 Turn off the DC bus power by placing the switch (on the left front of the power converter cabinet) in the "POWER OFF" position.

806 Turn the black handle on the right front of the power converter cabinet to "RESET/OFF."

807 Turn off the "Isolation Transformer" power using the "Cutler Hammer Heavy-Duty Safety Switch[®]."

808 Turn off the CDC-900 computer power using the black handle on the front of the CDC-900 cabinet in the test cell.

809 Turn off the RTM-200 computer and monitor power.

9. Data Input

9.1 The following information will automatically appear in the VDA test information dialog box when the prep is selected:

Vehicle manufacturer (Mfr)

Vehicle identification number (Veh ID)

Version

Test Type

Test Procedure (Test Proc)

Test Schedule (Test Sch)

Shift Schedule (Shift Sch)

Drive Schedule (Drive Sch)

- 9.2 The driver enters the following information in the VDA test information dialog box:
- Equivalent Test Weight (Eq Test Wgt)
 - Indicated dyno horsepower (Ind HP) for twin-roll hydrokinetic dynamometer, or the letters “COEF” for the 48" single-roll electric dynamometer
 - Driver Identification Number (Driver ID)
 - Dynamometer Site Number (Dyno Site)
- 9.3 The driver records the following information on the “Ambient Temperature” label on the strip chart or TAP printout:
- Date
 - Equipment Tracking Number (ET #)
 - Chart Speed
 - Dynamometer Number (Dyno #)
 - Test Number (Test #)
 - Vehicle Identification Number (Vehicle ID #)
 - Technician Identification Number (Tech ID #)
- 9.4 The technician enters the following information on Form 703-01:
- Vehicle ID #
 - Test #
 - Verify information by checking a space or entering NA.
 - Technician ID #
 - Date
- 9.5 On Form 708-01, the driver completes the following:
- | | |
|----------------|---|
| PREP DATE | Card B, Columns 01 through 05 |
| LA4 PREP ID | Card B, Columns 53 through 57 |
| PREP DYNO SITE | Card B, Columns 58 through 61 |
| PREP KEY OFF | Card H, Columns 72 through 75 (use military time) |

- 9.6 If the 48" single-roll electric dynamometer is used, the driver enters the following on the "Vehicle Simulation Parameters" screen of the RTM-200 computer (if not already entered):

- Test number
- Vehicle ID number
- Inertia (ETW)
- A, B, and C coefficients.

10. Data Analysis

The technician performing the analysis should be familiar with this procedure and should not have performed any of the preceding steps.

10.1 Review the Video Driver's Aid Test Report.

- 10.1.1 Ensure that the following information matches corresponding entries on the VSR:

- Test number
- Vehicle manufacturer (Mfr)
- Vehicle identification number (Veh ID)
- Version
- Test Type
- Test Procedure (Test Proc)
- Shift Schedule (Shift Sch)
- Equivalent Test Weight (Eq Test Wgt)
- Indicated dyno horsepower (Ind HP) for twin-roll hydrokinetic dynamometer, or the letters "COEF" for the 48" single-roll electric dynamometer)
- The indicated horsepower is checked against the indicated horsepower vs. actual horsepower table located on each dyno. The actual horsepower is available on the VSR.

- 10.1.2 Ensure that the following information matches corresponding entries on Form 708-01:

- Driver Identification Number (Driver ID)
- Dynamometer Site Number (Dyno Site)

- 10.1.3 Ensure that all out-of-tolerance events have been addressed by the driver.
- 10.1.4 Subtract the Video Driver's Aid Test Report "FINISHED" time from the "PREP KEY OFF" time on Form 708-01. The time must be less than 5 minutes. If not, the preconditioning is void.
- 10.1.5 Subtract the Form 702-01 "End-of-Fueling Time" from the "Key Start" time on the Video Driver's Aid Test Report. The time must be less than 1 hour for a vehicle being preconditioned for an FTP exhaust emission test according to the 1978 test sequence. If not, the preconditioning is void.

The time must be at least 6 but not more than 36 hours for a vehicle being preconditioned for an FTP exhaust emission test according to the 1996 test sequence. If not, the preconditioning is void.

- 10.1.6 If there are omissions, inconsistencies, or errors on the Video Driver's Aid Test Report, Form 702-01, or Form 708-01, notify a VT senior technician.

If there are no omissions, inconsistencies, or errors on the Video Driver's Aid Test Report, enter your technician ID number and the date in the designated spaces on the report.

10.2 Review Form 703-01:

- 10.2.1 Verify that all spaces have been checked or marked N/A and that the following information matches corresponding entries on the Video Driver's Aid Test Report:

Vehicle ID #

Test Number

Technician ID # (Driver)

Date

- 10.2.2 If there are omissions, inconsistencies or errors on Form 703-01, notify a VT senior technician. If there are no omissions, inconsistencies, or errors on Form 703-01, enter your technician ID number in the "Verified By" space and today's date in the "Date" space.

10.3 Review the ambient temperature strip chart or TAP to ensure adherence to the 68-86 °F ambient temperature requirement.

- 10.3.1 Verify that the driver indicated on the stripchart when the vehicle was on the dyno and when the prep began and ended for each preconditioning cycle in the case of multiple preps.
- 10.3.2 Verify that the “Ambient Temperature” label, “ET #” and “Chart Speed” entries are reasonable and that the following information matches the respective entries on the Video Driver's Aid Test Report:
 - Date
 - Dyno #
 - Test #
 - Vehicle ID #
 - Tech ID # (Driver)
- 10.3.3 If there are inconsistencies or errors in the stripchart or label, notify a VT senior technician. If there are no omissions, inconsistencies, or errors on the stripchart or label, enter your technician ID number and today's date in the “Ver. ID#” space on the label.
- 10.4 If the vehicle was preconditioned on a single-roll electric dynamometer, review the “DYNAMOMETER REPORT”
 - 10.4.1 Verify that the inertia (ETW) and the A, B, and C coefficients corresponds to the VSR.
 - 10.4.2 Verify that the average positive simulation error is less than 0.05% and the average negative simulation error is less than -0.05%.
 - 10.4.3 If there are no omissions, inconsistencies, or errors on the “DYNAMOMETER REPORT,” enter your technician ID number and the date on the report. If there are omissions, inconsistencies, or errors on the “DYNAMOMETER REPORT,” notify a VT senior technician.

11. Data Output

- 11.1 VDA file of the drive schedule is permanently archived on the LNS production server
- 11.2 Video Driver's Aid Test Report
- 11.3 Form 703-01, or Form 703-02

- 11.4 TAP printout or Ambient Temperature Stripchart
- 11.5 If the 48" single-roll electric dynamometer is used, "DYNAMOMETER REPORT" printout including a plot of average simulation error. This report is placed in the test packet.
- 11.6 Form 801-01

12. Acceptance Criteria

The following criteria must be met for the preconditioning to be valid:

- 12.1 For a vehicle scheduled for an FTP exhaust emission test according to the 1978 test sequence, preconditioning must begin within 1 hour of vehicle refueling.
- 12.2 For a vehicle scheduled for an FTP exhaust emission test according to the 1996 test sequence, preconditioning must begin within a minimum of 6 and a maximum of 36 hours of vehicle refueling.
- 12.3 Ambient temperature levels encountered by the vehicle shall not be less than 68 °F nor more than 86 °F.
- 12.4 The Vehicle must be driven within the following UDDS speed tolerances:
 - The upper limit is 4 mph higher than the highest point on the trace within 1 second of the given time. The lower limit is 4 mph lower than the lowest point on the trace within 1 second of the given time.
 - Speed variations greater than the tolerances (such as may occur during gear changes, etc.) are acceptable provided they are less than 2 seconds in duration.
 - Acceptable speed variations may occur during gear changes, brake spikes, engine, stumbling, etc.
 - Speeds lower than those prescribed are acceptable provided the vehicle is operated at maximum available power during such occurrences.
- 12.5 Within five minutes of completion of preconditioning, the vehicle shall be driven off the dynamometer and parked.
- 12.6 The dynamometer inertia simulation must be set to the exact inertia value.

- 12.7 The twin-roll hydrokinetic dynamometer loading must be set to the correct indicated horsepower.
- 12.8 The 48" single-roll electric dynamometer must be set to the correct inertia and A, B, and C coefficients.
- 12.9 The 48" single-roll electric dynamometer average positive simulation error must be less than 0.05% and the average negative simulation error must be less than -0.05%.

13. Quality Provisions

- 13.1 All forms and test records are verified by a qualified technician who did not record the data. The verifying technician checks the data for completeness, correctness, and compliance with EPA regulations. They will write their identification number and date in the "Verified By" area of the forms. This certifies that the data are correct and complete.
- 13.2 The technician follows the sequence of steps on Form 703-01, recording data as needed.
- 13.3 The dynamometer equivalent test weight is verified by the driver.
- 13.4 The twin-roll hydrokinetic dynamometer indicated horsepower is set correctly by the driver.
- 13.5 The 48" single-roll electric dynamometer vehicle/dyno class, inertia, and A, B, and C coefficients are verified by the site operator.
- 13.6 Positive and negative simulation error on the 48" single-roll electric dynamometer are verified by the driver.
- 13.7 The identification number of the technician performing this process appears on all forms and test records, certifying that the data are accurate and complete.
- 13.8 Deviations from this procedure are documented on Form 902-01. In general, these deviations will void the data. However, the customer may choose to accept the data as variant. To do this, the customer must indicate acceptance by signing and dating Form 902-01.

Attachment A Vehicle Preconditioning

Vehicle ID # _____ Test Number _____

_____ Highway Retest , Check Fuel Level _____

Label the ambient temperature strip chart or TAP with the date, test #, dyno #, driver's #, vehicle manufacturer, vehicle identification number, chart speed, and equipment tracking ID number. Indicate when the vehicle is in the test cell.

The tire pressure @ 45 psi or set @ _____ psi.

Twin-Roll Hydrokinetic Dynamometer

_____ The correct horsepower is selected and correct inertia weights are engaged.

_____ The roll selection switch is in the Rear Roll Position.

48" Single Roll Electric Dynamometer

_____ The correct vehicle class, inertia and A, B, and C coefficients are selected.

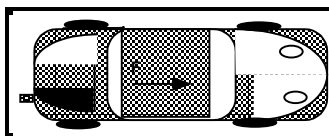
_____ The dyno is in "RUN MODE" and contactor is engaged.

_____ The roll brake is off, cradles are down and roll is not moving.

_____ Verify the following: All vehicle accessories are off and all the windows down.

The VDA Test Information is entered correctly.

The vehicle hood is open and that the fan(s) is (are) positioned within 12 inches of vehicle, and are operational. Indicate the placement of the fan(s) below:



1978 test sequence, prep must start within 1 hour of vehicle fueling

1996 test sequence, prep must start within 6-36 hours of vehicle fueling

At the start of the prep, mark SOP; at the end of the prep, mark EOP on the ambient temperature strip chart. The engine off time must be less than 5 minutes from end-of-prep.

Record the LA-4 Prep driver ID#, dyno number, and prep key off time on Form 708-01.

Enter any comments, if required, in the Summary Report.

On the VDA Report describe any abnormal occurrences or driveability problems.

Signature

I have performed all steps in accordance with the requirements of Test Procedure 703.

Technician ID #: _____ Date: _____

The data entries are correct and meet the requirements of Test Procedure 703.

Verified by: _____ Date: _____

Attachment B
Diesel Vehicle Preconditioning

Vehicle ID # _____ **Test Number** _____

____ Highway Retest , Check Fuel Level _____

Label the ambient temperature strip chart or TAP with the date, test #, dyno #, driver's #, vehicle manufacturer, vehicle identification number, chart speed, and equipment tracking ID number. Indicate when the vehicle is in the test cell.

____ Verify the following:

The tire pressure set to 45 psi Or set @ _____ psi

The correct horsepower is selected and correct inertia weights are engaged.

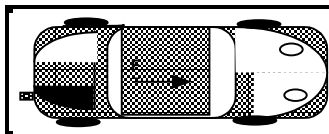
The roll selection switch is in the Rear Roll Position.

All vehicle accessories are off and all the windows down.

The VDA Test Information is entered correctly.

The vehicle hood is open and that the fan(s) is (are) positioned within 12 inches of vehicle, and are operational.

Indicate the fan(s) placement below:



Prep must start within 1 Hour of vehicle fueling.

At the start of the prep, mark SOP; at the end of the prep, mark EOP on the ambient temperature strip chart.

Engine off time must be less than 5 minutes from end of Prep.

Record the LA-4 Prep driver ID#, dyno number, and prep key off time on Form 708-01.

Enter any comments, if required, in Summary Report.

On the VDA Report describe any abnormal occurrences or driveability problems.

Particulate Filter Stabilization Check (Particulate Tests Only)

Record Filter Numbers _____ - _____ on petri dishes

Pre-test soak start time: _____ Date: _____

Signature

I have performed all steps in accordance with the requirements of Test Procedure 703.

Technician ID #: _____ Date: _____

The data entries are correct and meet the requirements of Test Procedure 703.

Verified by: _____ Date: _____

Attachment C

```
*****
* VIDEO DRIVER'S AID TEST REPORT (1.22b3)                      Page 1 of 3 *
* 0195^0000^P1                      Processed: 08:13:23 01/30/95 *
*****
```

-- Test and Vehicle Information --

```
Test Sch: 0195^0000^P1      Mfr:
Shift Sch: A474-0001      Veh ID:
Drive Sch: LA4(PrepOnly)   Version: 00
Test Type: 01             Eq Test Wgt:3875
Test Proc: 02             Ind HP: 7.0
Driver ID: 42044          Dyno Site: 0002
Key Start: 16:12:34 11/12/94
```

-- Test Control Events --

trace time	clock time stamp	test control	event time seconds	CUS status
.0		SETUP		
.0	16:11:06	READY	88.6	RDY
.0	16:12:34	STARTUP	.3	RDY
.0	16:12:34	DRIVE	1369.0	RDY
1369.0	16:35:24	FINISHED	.1	EOT

-- Out of Tolerance Data --

-- Comments --		last in tol @trace	back in tol @trace	secs out	max mph out
trace time	comments				

<no comments or out of tolerance events>

I have validated the data in accordance with the requirements of TP 703.

Technician ID#: _____ Date: _____

prep tolerance is +/- 4 mph per CFR 86.115-78(b)(1)(v)

Attachment D

HORIBA ELECTRIC DYNAMOMETER
CDC-900
DYNAMOMETER REPORT

TEST SITE: DO05
ARCHIVE REC: 9999
TEST NUMBER: 95-xxxx
VIN: Example
OPERATOR: 42044

END DATE: Mar 29 1995
END TIME: 20:39:20
TIME STARTED: 20:14:20

COMMENT: This is an example of the data

DIRECTION: FORWARD
AUGMENTED BRAKING: OFF
GRADE: OFF

INERTIA: 3625 LBS

ROAD LOAD: 8.60 HP@50
A: 3.87 LBS
B: -0.0028 LB/MPH
C: 0.02430 LB/MPH2

DISTANCE TRAVELED: 3.920 MILES

ENERGY TRANSFERRED FROM VEHICLE: 3722.3 HP-S
ENERGY TRANSFERRED TO VEHICLE: 2130.8 HP-S

AVERAGE POSITIVE ERROR: 0.02 %
AVERAGE NEGATIVE ERROR: -0.02 %

F O R C E E R R O R S T A T I S T I C S

SPEED RANGE MPH	NUM PTS	MINIMUM LBS	MAXIMUM LBS	AVERAGE LBS	STD DEV LBS
5 - 15	24	-3.960	2.463	-0.947	1.633
15 - 25	156	-7.429	3.106	0.013	1.316
25 - 35	132	-3.725	5.102	0.063	0.990
35 - 45	18	-1.813	3.891	0.142	1.460
45 - 55	83	-1.250	1.243	-0.075	0.533
55 - 65	34	-0.734	0.646	0.112	0.290
65 - 75	0	0.000	0.000	0.000	0.000
75 - MAX	0	0.000	0.000	0.000	0.999

PARASITIC LOSSES RECORD: 217

LOSS CURVE COEFFICIENTS:

a: -0.249 LBS
b: 0.020 LB/MPH
c: 0.000478 LB/MPH2
d: 0.000001 LB/MPH3

Attachment E

UDDS Preconditioning Specifications

The technician will follow the driving schedule trace as closely as possible and may use the choke, accelerator pedal, etc., where necessary to keep the engine running. Accelerations shall be driven smoothly and the vehicle shall be driven with minimum accelerator pedal movement to maintain the desired speed. Deceleration modes shall be run in gear using the brakes or accelerator pedal as necessary to maintain the desired speed.

If the vehicle has an automatic transmission, idle modes shall be run with the automatic transmission in drive and the brakes applied. If the vehicle has a manual transmission, shift the gears at the points specified on the driving schedule. In cases where the manufacturer recommends special shift points or use of a shift indicator light, an appropriate VDA driving schedule will be provided with the special shift points indicated. The technician shall release the accelerator pedal during each shift and accomplish the shift in minimum time.

For those modes which decelerate to zero, manual transmission clutches shall be depressed when the speed drops below 15 mph, when engine roughness is evident, when engine stalling is imminent, or where noted on special shift schedules. Optional downshifts (the 187-second and 840-second points on the driver's trace) are made only at the manufacturer's request or to prevent lugging or stalling.

Idle modes shall be run with the transmission in gear and the clutch disengaged, except for the first idle. If the engine stalls during an idle period (other than the initial idle), restart the engine immediately using hot-start procedures and continue the preconditioning. If the engine cannot be restarted before the next acceleration, immediately stop the VDA trace by pressing <Command-Space Bar> and restart the engine.

If the engine starts, immediately restart scrolling of the VDA trace by pressing <Command-S>. If the engine does not restart, immediately attempt to restart the engine again, cranking for 10 seconds and pausing for 10 seconds, for up to 1 minute. If the engine does not start within 1 minute, notify the VT senior technician. Make no further attempts to restart the engine at this time.

If the engine stalls during a non-idle mode, immediately stop the VDA trace by pressing <Command-Space Bar>. It is not necessary to bring the drive wheels to a stop. The engine shall then be restarted and the vehicle accelerated to the speed required at that point in the driving schedule. During acceleration to this point, shifting shall be performed in accordance with CFR 86.128. When the vehicle reaches the required point on the VDA trace, immediately restart scrolling of the VDA trace by pressing <Command-S>. If the engine does not restart, immediately attempt to restart the engine again, cranking for 10 seconds and pausing for 10 seconds, for up to 1 minute. If the engine does not start within 1 minute, notify the VT senior technician. Make no further attempts to restart the vehicle. The preconditioning shall be void, the vehicle removed from the dynamometer, corrective action taken, and the vehicle rescheduled for testing.

The speed tolerances for the UDDS Vehicle Preconditioning trace are as follows:

The upper limit is 4 mph higher than the highest point on the trace within 1 second of the given time.

The lower limit is 4 mph lower than the lowest point on the trace within 1 second of the given time.

Speed variations greater than these tolerances (such as may occur during gear changes) are acceptable provided they are less than 2 seconds in duration. Acceptable speed variations may occur during gear changes, brake spikes, engine stumbling, etc. Speeds lower than those prescribed are acceptable provided the vehicle is operated at maximum available power (MAP) during such occurrences.

If a vehicle fails to achieve the required acceleration rate under wide open throttle (WOT) during the UDDS, the preconditioning will be completed and the VT senior technician, Certification Division (CD) Representative, and the EPA Task Officer (in-use vehicles) will be notified. The CD representative or EPA Task Officer will then determine the acceptability of the shift schedule.

Attachment F


VDA Operation

- 1.0 VDA System: To operate the VDA, you may need to view MacAcademy's "Basic Macintosh" videotape, which is a self-taught course explaining the operation of the Macintosh personal computer. The following is a brief summary of techniques needed to use the mouse.
- 1.1 To operate the Mouse: Move the mouse around on a flat surface to position the pointer on the VDA screen. When you move the mouse, the pointer on the screen moves correspondingly.
- 1.2 To Click: Position the pointer on what you want to select or make active. Press and quickly release the mouse button.
- 1.3 To Double Click: Position the pointer on your selection. Press and release the mouse button twice in quick succession.
- 1.4 To Press: Position the pointer on a menu title. Without moving the mouse, press and hold the mouse button.
- 1.5 To Drag: Position the pointer on your selection. Press and hold down the mouse button and move the mouse to the new destination. Release the mouse button.
- 1.6 To Add Comments: Press <~>. This will flag the data for entry of a comment at a time convenient for the driver.
- 2.0 To start the VDA, enter the test cell and turn the video monitor power switch "ON." The control dialog box will appear at the bottom of the VDA screen, see below.

**Control dialog box**

Attachment F

- 3.0 The following is a list of the computer keyboard commands that are accessed by simultaneously using the command key with another key. The computer operations performed are listed below each combination.

The symbol for the command key is 

 S

Start cranking
Start scrolling
Try again

 Space Bar

Hold cranking
Hold scrolling

 K

Kill

- 4.0 Return to the control room and turn the hard disk computer drive (lower unit) power switch on, wait 15 seconds, then turn the Macintosh Computer power switch on. The computer will beep and an icon representing a floppy disk will appear on the screen. See Figure 1.

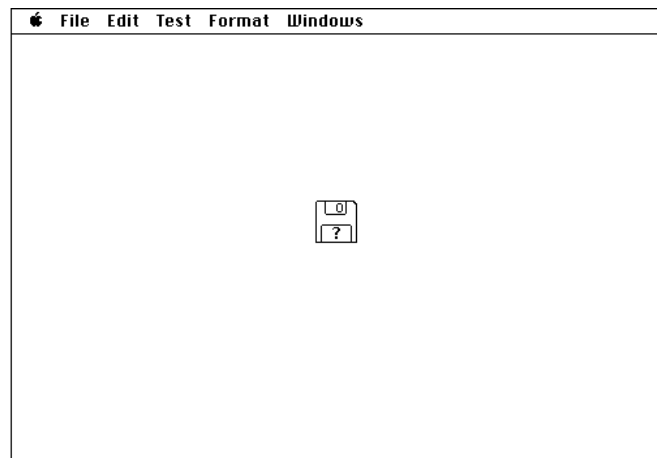


Figure 1

- 5.0 The message “Connect to the file server “LNS Production Server” as: Registered User” will appear. See Figure 2. The dyno number will be displayed in the “Name” box.

Type in the correct password and select the “OK” button.

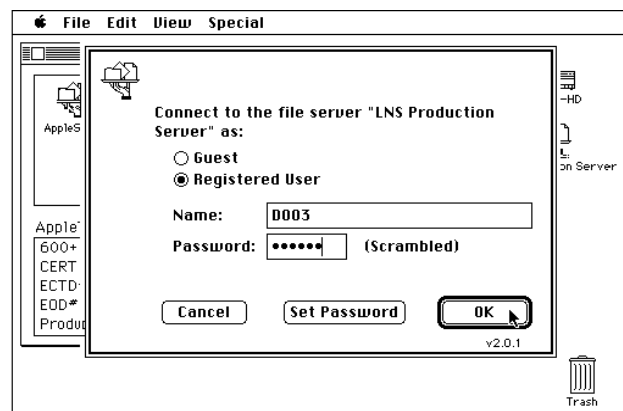


Figure 2

Attachment F

- 6.0 The clock synchronization program will automatically run and set the clock.
- 7.0 The “LNS Production Server” icon will appear. Position the mouse pointer on the icon and double click to open it. See Figure 3.

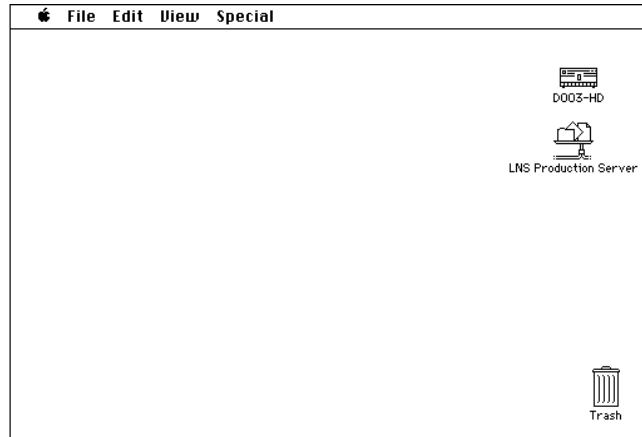


Figure 3

- 8.0 Position the mouse pointer on the “VDA” folder and double click to open it. See Figure 4.

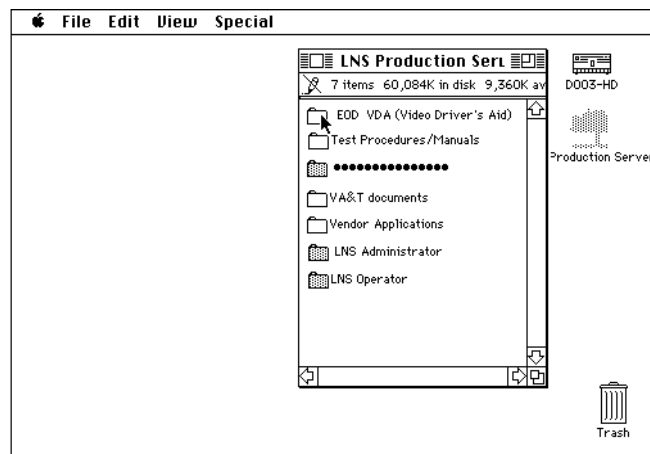


Figure 4

- 9.0 If an incorrect folder is selected, position the mouse pointer on the correct folder and select it. If an incorrect folder is opened, position the mouse pointer on the “Close” box in the upper left corner of the window and click to close it. Position the mouse pointer on the correct folder and double click on it.

Attachment F**10.0 Preps:**

- 10.1 Position the mouse pointer on the “2-PREPS to be done” folder and double click to open it. See Figure 5.

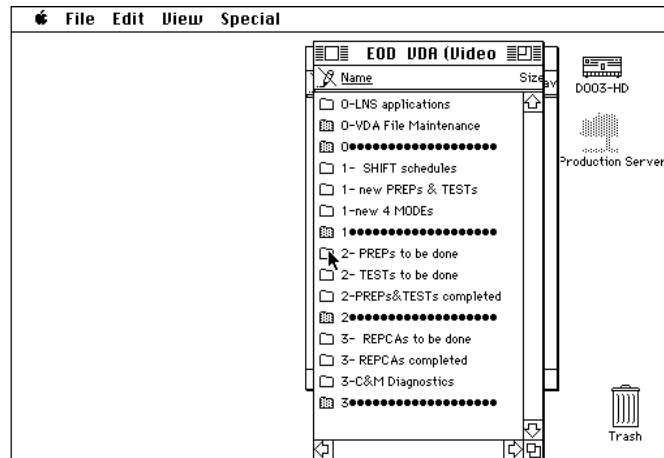


Figure 5

- 10.2 Position the mouse pointer on the “Preps” folder for the applicable day of the week and double click to open it (this example is for Monday). See Figure 6.

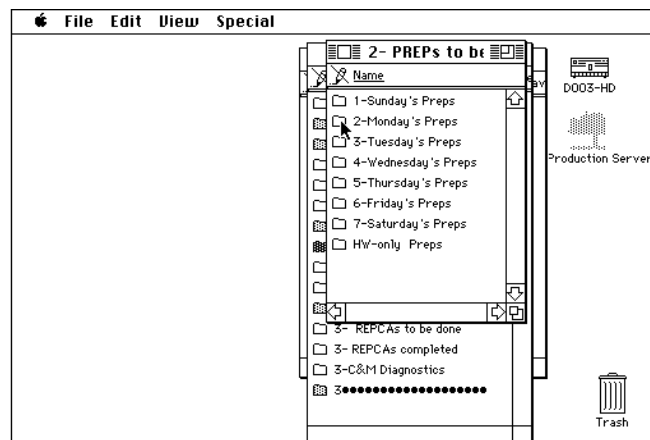


Figure 6

Attachment F

- 10.3 Position the mouse pointer on the appropriate test number and double click to open it. See Figure 7. If the test number cannot be located, contact the VT senior technician.

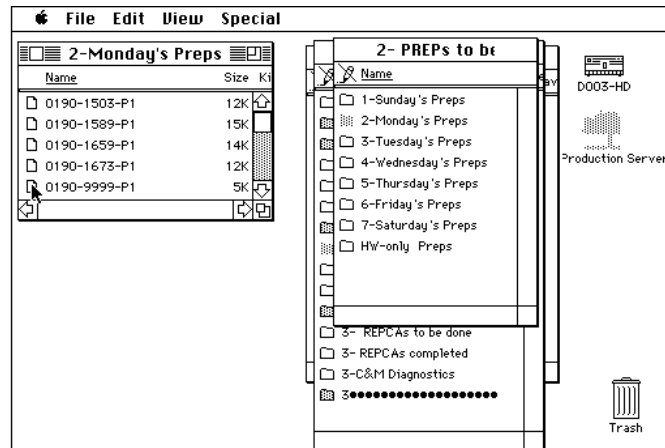


Figure 7

- 11.0 For FTP Tests:

- 11.1 Position the mouse pointer on the "2-TESTs to be done" folder and double click to open it. See Figure 8.

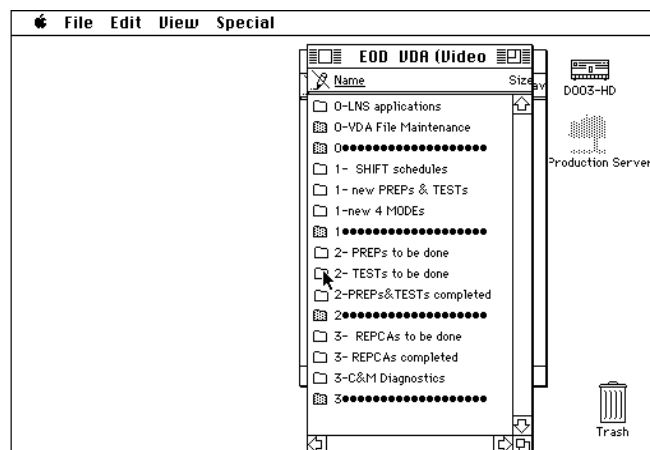


Figure 8

Attachment F

- 11.2 Position the mouse pointer on the tests folder for the applicable day of the week and double click to open it (this example is for Tuesday). See Figure 9.

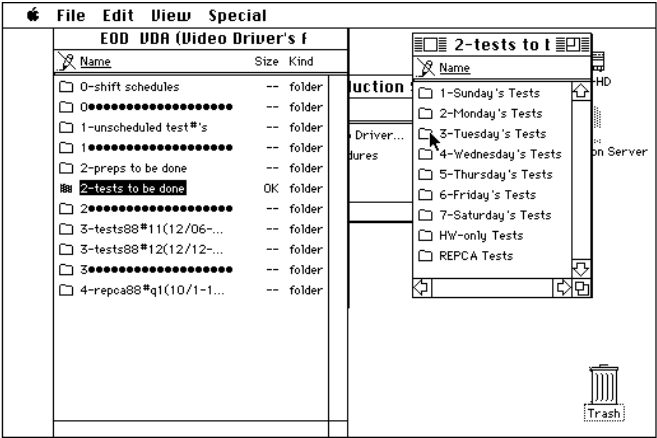


Figure 9

- 11.3 Position the mouse pointer in daily tests window on the appropriate test number and double click to open it . See Figure 10. If the test number cannot be located, notify the VT senior technician.

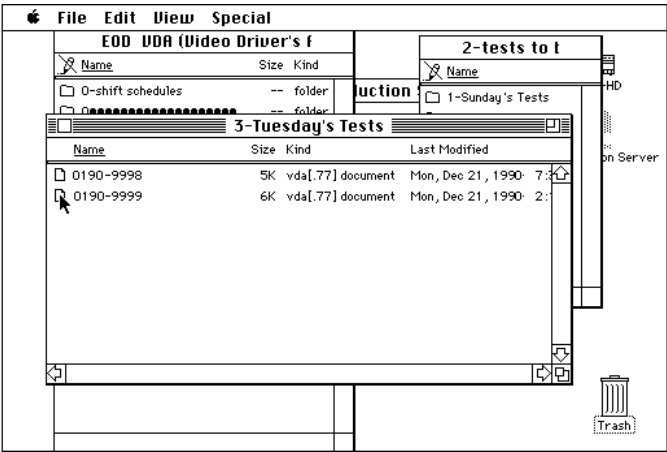


Figure 10

Attachment F

12.0 For Highway Tests:

12.1 Position the mouse pointer on the “2-TESTs to be done” folder and double click to open it. See Figure 11.

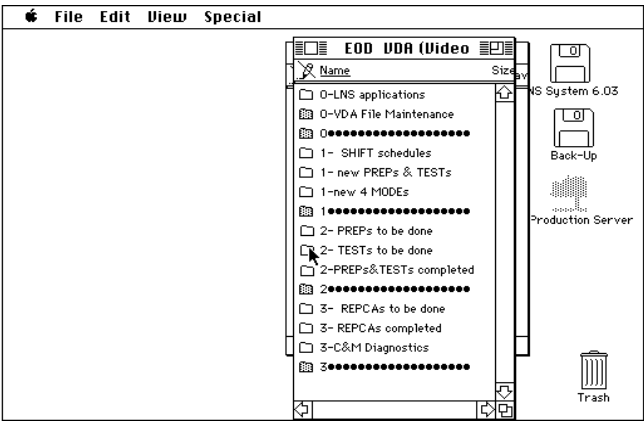


Figure 11

12.2 Position the mouse pointer on the tests folder for the applicable day of the week and double click to open it (the following example is for HW-only Tests). See Figure 12.

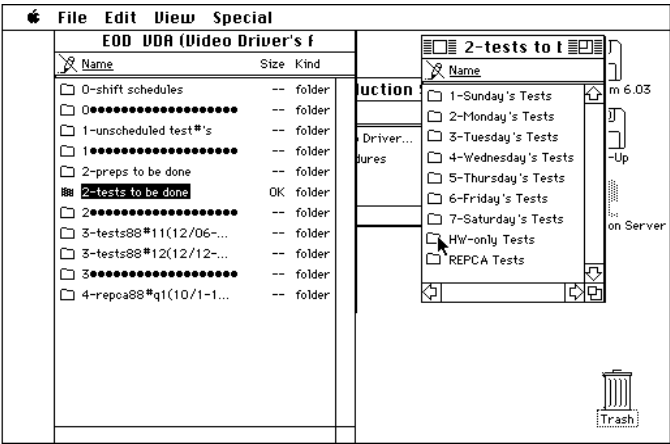


Figure 12

Attachment F

- 15.0 Check the information in the “Vehicle Information Dialog Box” against the VSR. See Figure 15. If the data are not correct, contact the VT scheduler.

If the test data are correct, enter the following in the appropriate boxes:

“Equivalent Test Weight”

“Indicated Dyno HP” for twin-roll hydrokinetic dyno, or the letters “COEF” for 48" single-roll electric dyno

“Driver's ID”

“Dyno Site”

File Edit Test Format Windows

0190-9999

VDA - Test Information Entry

MFR 040 Vin 12345678910 Version 00

Test Type: 01

Test Procedure: 02

Test Schedule: 0190-9999

Shift Schedule: A998-0005 (FTA.00)

Drive Schedule: LA4(PrepOnly)

Equiv Test Weight: 3000

Indicated HP: 8.0

Driver's ID: 17282

Dyno Site: D003

Is test data correct?

OK Cancel

Figure 15

- 16.0 Position the mouse pointer on the “OK” button and click on it.

When the VDA program is activated and the correct data have been entered, place a checkmark in the proper space on Form 707-01.

Attachment G

Editing VDA Events

- 1.0 To edit the “Summary Report,” position the mouse pointer on the scroll arrow and hold down the mouse button until the “Out-of-Tolerance Events” are in view. See Figure 1. Out-of-tolerance events must be documented.

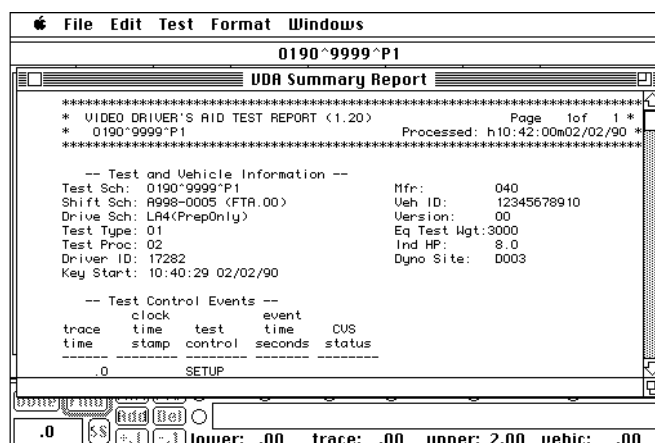


Figure 1

- 2.0 Close the Summary Report by positioning the mouse pointer on the “Close” box in the upper left corner and clicking it. The VDA will prompt you with the message “Do you want a hardcopy of the Summary Report?” See Figure 2.

If there are no out-of-tolerance events and no comments to be entered, position the mouse pointer on the “Yes” button, click to select it, and return to the next step in the procedure.

If there are out-of-tolerance events or comments to be entered, position the mouse pointer on the “No” button and click to select it.

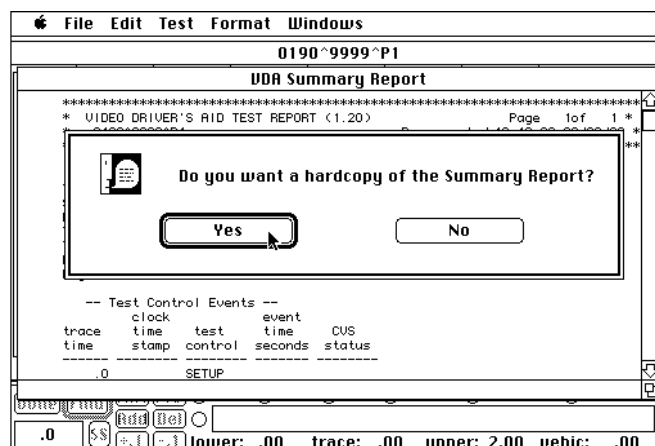


Figure 2

Attachment G

- 3.0 The “Edit Driving Events” function will be selected automatically at this time. The VDA analyzes the vehicle speed data and automatically enters default comments for out-of-tolerance and vehicle lagging events. The driver is responsible for replacing these default comments with an appropriate VDA comment (e.g., shift, brakes, WOT, etc.). These default events are located by positioning the mouse pointer on “Nxt” (Next event) and clicking.

The “Edit” function will advance the trace to the next event and draw a dotted line at that point. Select an appropriate event comment from the list by clicking in the circle next to it.

If an appropriate event comment is not listed, select the blank box by clicking in the circle next to it and type in an appropriate comment.

- 4.0 Select the “Add” button by clicking on it. Repeat until all out-of-tolerance and vehicle lagging events are located and have an appropriate comment. Comments shown in the “Edit” dialog box may be deleted by positioning the mouse pointer on “Del” (delete) and clicking. Out-of-tolerance comments must not be deleted.

- 5.0 Other comments can be entered to describe any situation encountered during a prep (e.g., WOTs, brakes grabbing, etc.). To enter any other comment, enter the time of the occurrence in the time box located in the lower left corner of the screen. Select the “Find” button by positioning the mouse pointer on it and clicking. The “Edit” function will advance the trace to the time selected and draw a dotted line at that point.

If the line is not exactly on the point desired, you can change the entry in the time box and select “Find” again. You can also use the mouse pointer by clicking on the trace at the most appropriate point. Clicking on the “+.1” (advance) or the “-.1” (reverse) buttons will change the position by 0.1 second.

- 6.0 Select the “Done” button to close “Editing Driving Events.”

- 7.0 To save the VDA test data after “Editing Driving Events,” the VDA will prompt you with the message “Do you want to save the data in this window?” Position the mouse pointer on “Save” and click to select it. See Figure 3.

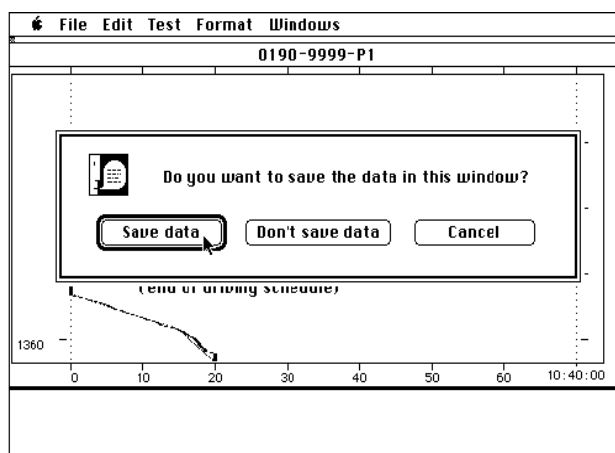


Figure 3

Attachment G

- 8.0 The VDA will prompt you with the message “Do you want a hardcopy of the Summary Report?” Position the mouse pointer on the “Yes” button and click to select it if you wish to print the report. See Figure 4.

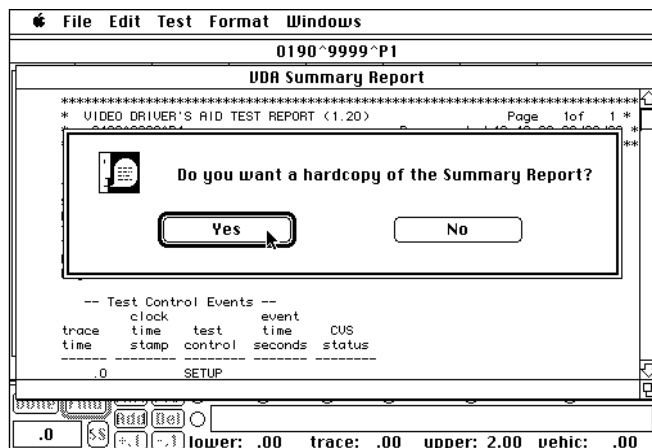


Figure 4

- 9.0 The LaserWriter print specification dialog box will appear, position the mouse pointer on “OK” and click on it. See Figure 5.

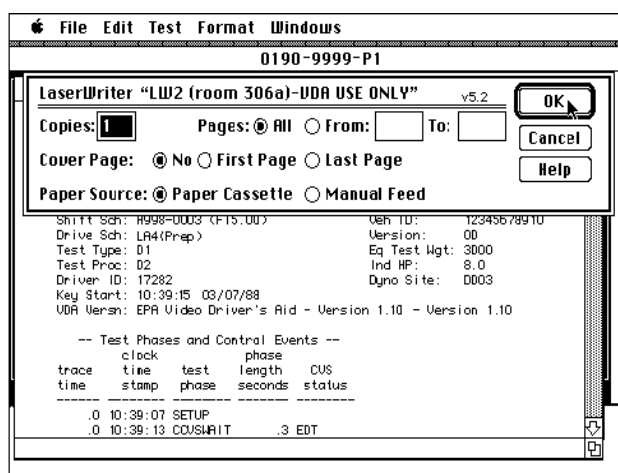



Figure 5

Attachment G

- 10.0 To quit the VDA program, position the mouse pointer on “File” (in menu bar) and press and hold down the mouse button, opening the “File” menu. Continue to hold down the mouse button, pull the mouse toward you, and position the pointer on “Quit”; then release the mouse button to select it. See Figure 6.

Note: The “Quit” command may also be initiated by simultaneously pressing <  Q >.

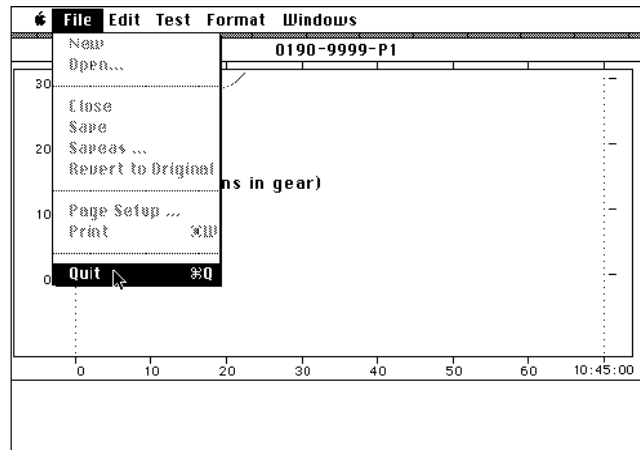


Figure 6